



ISTEP+: Grade 5

Mathematics

Released Part 1 Applied Skills (open-ended) Items
and Scoring Notes

Introduction

The *ISTEP+* Spring 2016 test was administered to Indiana students in Grades 3-8 and 10. The test included two parts: Part 1 was given in March, and Part 2 took place in late April and early May. Part 1 contained Applied Skills test questions (also referred to as open-ended items) that were hand scored by trained evaluators, and Part 2 was machine scored. Scores for Part 1 and Part 2 are combined to generate a student's total score.

Test results, as well as images of the Applied Skills student responses, are available online, and schools are expected to discuss results with parents and students. As a springboard for these conversations and to serve as a resource for teachers, the Indiana Department of Education has created this document, which consists of the following:

- a brief description of the types of questions on the test
- a short summary of scoring rules utilized by the trained evaluators
- a copy of the rubrics—or scoring guides—used by evaluators to score student responses
- a copy of the released Applied Skills questions (*“released” means the items are posted on the web and are no longer secure; therefore, the released test items can be discussed and used with students as future practice items*)
- anchor papers—or sample student responses—used by evaluators to distinguish between score points

Notes:

- The Part 1 open-ended questions are released when test results are made available.
- It is important to keep in mind that the majority of a student's score is calculated from items in Part 2. Since Part 2 items are secure and are not released, they are not included in this document.

Question Types

This document addresses questions from *ISTEP+ Part 1*. Students demonstrate their knowledge and understanding by responding to items that are open-ended, providing written responses in a short-answer or essay-type format.

Part 1 consists of the following test question types: Constructed-Response (CR), Extended-Response (ER), and a Writing Prompt (WP). Item types vary by subject area. Math, Science, and Social Studies include CR and ER items. English/Language Arts includes CR and WP test questions.

Scoring

The questions on *ISTEP+ Part 1* are scored by evaluators who must have a four-year college degree and pass a series of qualifying tests. Prior to scoring student responses, evaluators receive extensive training to ensure that student responses are scored accurately and consistently.

For Part 1 of *ISTEP+*, each question is scored according to a rubric, or scoring guide. Rubrics clearly define the requirements for each score point. A set of student responses representing all of the score points on a rubric are selected as anchor papers (exemplars) and are used as clear examples of specific score points. Samples of anchor papers are presented within this document.

| ISTEP+ Part 1: Mathematics | | |
|----------------------------|---|-------------------------------------|
| Question Type | Score Reporting Categories | Scoring Method |
| Constructed-Response (CR) | Computation Algebraic Thinking Geometry Measurement Data Analysis Mathematical Process | 2-pt. CR Rubric (Grades 3-8, 10) |
| Extended Response (ER) | Computation Algebraic Thinking Geometry Measurement Data Analysis Mathematical Process | 4-pt. ER Rubric (Grades 3-8, 10) |

If a student's response is unable to be scored, it is assigned one of the following condition codes:

- A** Blank/No Response/Refusal
- B** Illegible
- C** Written predominantly in a language other than English
- D** Insufficient response/Copied from text
- E** Response not related to test questions or scoring rule (not applied to Mathematics questions)

More information is available regarding assessment topics on the Office of Student Assessment homepage at <http://www.doe.in.gov/assessment>.

Constructed-Response Rubric

| Content Rubric | |
|----------------|--|
| 2 | A score of two indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows algorithms, computations, and other content related work executed correctly and completely. |
| 1 | A score of one indicates a partial understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> contains errors in the execution of algorithms, computations, and/or other content related work. |
| 0 | A score of zero indicates limited or no understanding of the mathematical concepts embodied in the task. |
| Process Rubric | |
| 2 | A score of two indicates a thorough understanding of the problem-solving concepts embodied in the task. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. identifies all important elements of the problem and shows a complete understanding of the relationships among them. provides clear and complete explanations and/or interpretations when required. |
| 1 | A score of one indicates a partial understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy contains errors and/or is incomplete. identifies some of the important elements of the problem and shows a general understanding of the relationships among them. provides incomplete, partial, or unclear explanations and/or interpretations when required. |
| 0 | A score of zero indicates limited or no understanding of the problem-solving concepts embodied in the task. |

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 1 point in content and a maximum of 1 point in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the “content” portion is used with an appropriate strategy to solve the problem.

Extended-Response Rubric

| Content Rubric | |
|------------------------|--|
| 3 | A score of three indicates a thorough understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows algorithms, computations, and other content related work executed correctly and completely. |
| 2 | A score of two indicates a partial understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> shows an attempt to execute algorithms, computations, and other content related work correctly and completely; computation errors or other minor errors in the content related work may be present. |
| 1 | A score of one indicates a limited understanding of the mathematical concepts embodied in the task. The response <ul style="list-style-type: none"> contains major errors, or only a partial process. contains algorithms, computations, and other content related work which may only be partially correct. |
| 0 | A score of zero indicates no understanding of the mathematical concepts embodied in the task. |
| Problem-Solving Rubric | |
| 3 | A score of three indicates a thorough understanding of the problem-solving concepts embodied in the task. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem, and the strategy is executed correctly and completely. identifies all important elements of the problem and shows a complete understanding of the relationships among them. provides clear and complete explanations and/or interpretations when required. |
| 2 | A score of two indicates a partial understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy lacks an essential element. identifies some of the important elements of the problem and shows a general understanding of the relationships among them. provides incomplete or unclear explanations and/or interpretations when required. |
| 1 | A score of one indicates a limited understanding of the problem-solving concepts embodied in the task. The response contains one or more of the following errors. The response <ul style="list-style-type: none"> shows an appropriate strategy to solve the problem. However, the execution of the strategy is applied incorrectly and/or is incomplete. shows a limited understanding of the relationships among the elements of the problem. provides incomplete, unclear, or omitted explanations and/or interpretations when required. |
| 0 | A score of zero indicates no understanding of the problem-solving concepts embodied in the task. |

Clarification and Implementation Guidance

- Correct answers ONLY, on all parts of the problem with no work shown, will receive a maximum of 2 points in content and a maximum of 2 points in Problem Solving.
- A student can receive the top score point in Problem Solving if the strategy used would result in a correct answer even though the response contains computation errors.
- A student can receive the top score point in Problem Solving if an error made in the “content” portion is used with an appropriate strategy to solve the problem.

Item #1
Constructed-Response

Constructed-Response
Standard 5: Measurement
Standard 7: Mathematical Process

Question 1

- 1.** Megan has a garden in the shape of a parallelogram, as shown.



Part A

What is the area, in square yards, of the garden?

Show All Work

Answer _____ square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds. How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

Answer \$ _____

Exemplary Response:

- 120 square yards

AND

- \$24
- Sample Process:

$$A = bh$$

$$A = 20 \times 6$$

$$A = 120 \text{ square yards}$$

$$120 \times 5 = 600 \text{ seeds}$$

$$600 / 50 = 12 \text{ packages}$$

$$12 \times \$2 = \$24$$

Question 1, Sample A – Measurement Score Point 2; Process Score Point 2

Part A

What is the area, in square yards, of the garden?

Show All Work

$$\begin{array}{r} 20 \\ \times 6 \\ \hline 120 \end{array}$$

Answer 120 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} 120 \\ \div 5 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 120 \\ \times 2 \\ \hline 240 \end{array}$$

12 packs

Answer \$ 24

Scoring Notes: The response demonstrates a thorough understanding of finding the area of parallelograms by providing a valid setup and calculating the correct area in Part A. The response demonstrates a thorough understanding of reasoning quantitatively by providing a valid setup and calculating the correct cost in Part B. This response receives two points for content and two points for process.

Question 1, Sample B – Measurement Score Point 2; Process Score Point 1

Part A

What is the area, in square yards, of the garden?

Show All Work

$$\begin{array}{r} 20 \\ \times 6 \\ \hline 120 \end{array} \text{ sq. yds.}$$

Answer 120 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} 120 \\ \times 5 \\ \hline 600 \end{array}$$

$$\begin{array}{r} 12 \\ 50 \overline{) 600} \\ \underline{-50} \\ 100 \\ \underline{-100} \\ 0 \end{array}$$

Answer \$ 12 dollars

Scoring Notes: The response demonstrates a thorough understanding of finding the area of parallelograms by providing a valid setup and calculating the correct area in Part A. The response demonstrates a partial understanding of reasoning quantitatively by calculating a correct cost based on an invalid setup for Part B (failed to multiply 12 by 2). This response receives two points for content and one point for process.

Question 1, Sample C – Measurement Score Point 1; Process Score Point 0

Part A

What is the area, in square yards, of the garden?

Show All Work

$$\begin{array}{r} 20 \\ \times 6 \\ \hline 120 \end{array}$$

Answer 12 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} 60 \\ + 50 \\ \hline 110 \end{array}$$
$$\begin{array}{r} 2 \overline{)120} \\ -120 \\ \hline 00 \\ -00 \\ \hline 00 \end{array}$$

Answer \$ 110

Scoring Notes: The response demonstrates a partial understanding of finding the area of parallelograms by providing a correct setup in Part A. However, there is a transcription error because 12 is shown in the answer blank instead of 120. The response demonstrates a limited understanding of reasoning quantitatively by providing an invalid setup and calculating the cost incorrectly in Part B. This response receives one point for content and zero points for process.

Question 1, Sample D – Measurement Score Point 1; Process Score Point 0

Part A

120

What is the area, in square yards, of the garden?

Show All Work

Answer 120 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} 23 \\ 3 \\ \hline 69 \end{array}$$

$$\begin{array}{r} 50 \\ 3 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 50 \\ 2 \\ \hline 100 \end{array}$$

Answer \$ 6

Scoring Notes: The response demonstrates a partial understanding of finding the area of parallelograms by calculating the correct area. However, setup or work is shown for Part A. The response demonstrates a limited understanding of reasoning quantitatively by providing an invalid setup and calculating the cost incorrectly in Part B. This response receives one point for content and zero points for process.

Question 1, Sample E – Measurement Score Point 0; Process Score Point 2

Part A

What is the area, in square yards, of the garden?

Show All Work

$$\begin{array}{r} \times \quad 20 \\ 10 \\ \hline \times 200 \\ 6 \\ \hline 1200 \end{array}$$

Answer 1,200 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} \times 120 \\ 2 \\ \hline 240 \end{array}$$

$$\begin{array}{r} \times 1,200 \\ 5 \\ \hline 6,000 \end{array}$$

$$\begin{array}{r} 120 \\ 50 \overline{) 6,000} \\ \underline{- 50} \\ 100 \\ \underline{- 100} \\ 00 \\ \underline{- 0} \\ 0 \end{array}$$

Answer \$ 240

Scoring Notes: The response demonstrates a limited understanding of finding the area of parallelograms by providing an invalid setup and calculating the area incorrectly in Part A. The response demonstrates a thorough understanding of reasoning quantitatively by providing a valid setup and calculating the correct cost in Part B based on the incorrect response from Part A. This response receives zero points for content and two points for process.

Question 1, Sample F – Measurement Score Point 0; Process Score Point 0

Part A

What is the area, in square yards, of the garden?

Show All Work

$$\begin{array}{r} 20 \\ \times 6 \\ \hline 120 \end{array} + 16 =$$

Answer 136 square yards

Part B

Megan will plant 5 pumpkin seeds for every 1 square yard in her garden. Pumpkin seeds cost \$2 for a package of 50 seeds.

How much will it cost Megan to buy enough pumpkin seeds to plant in her garden?

Show All Work

$$\begin{array}{r} 13 \\ \times 5 \\ \hline 680 \end{array}$$

$$\begin{array}{r} \$13 \\ 50 \overline{) 680} \\ \underline{50} \\ 180 \\ \underline{150} \\ 30 \end{array}$$

Answer \$ 13

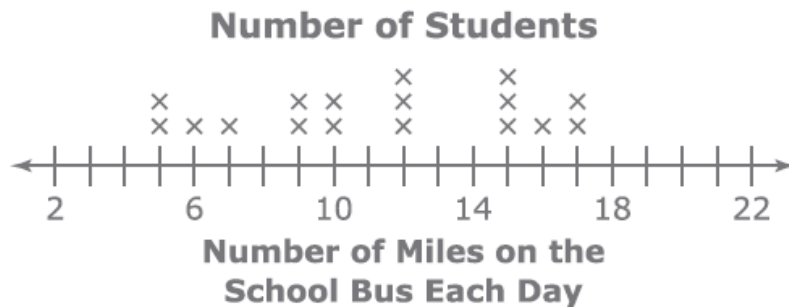
Scoring Notes: The response demonstrates a limited understanding of finding the area of parallelograms by providing an invalid setup and calculating the area incorrectly in Part A. The response demonstrates a limited understanding of reasoning quantitatively by providing an invalid setup and calculating the cost incorrectly in Part B based on the incorrect response from Part A. This response receives zero points for content and zero points for process.

Item #2
Constructed-Response

Constructed-Response
Standard 6: Data Analysis
Standard 7: Mathematical Process

Question 2

2. The students in Mr. Warren's class record the number of miles they ride the bus to school each day on the line plot, as shown.



The data for Joseph, Zoey, and Sara have not been included on the line plot. Their data are given.

- Joseph rides the bus 9 miles each day.
- Zoey rides the bus 6 miles each day.
- Sara rides the bus 2 miles each day.

Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

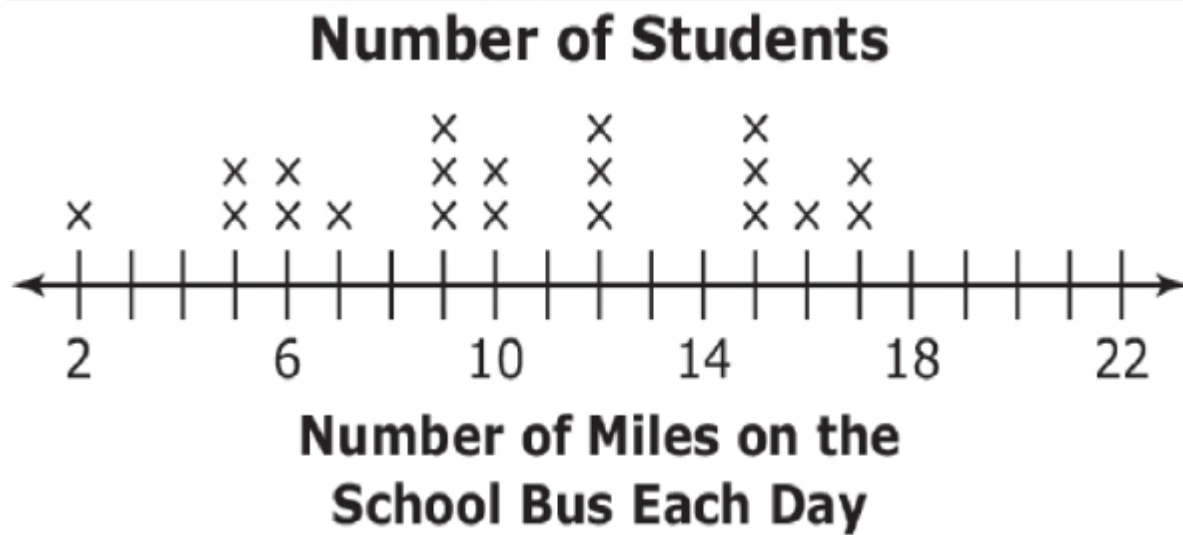
Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer _____ miles

Exemplary Response:



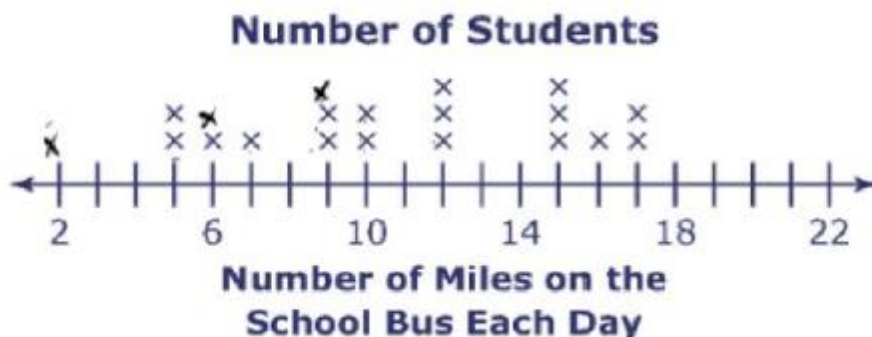
AND

- There are 20 students that ride the bus every day. Each X represents one student. There are 17 Xs on the graph and I added 3 more. That is a total of 20 students.
- Other valid explanation

AND

- 15 miles

Question 2, Sample A – Data Analysis Score Point 2; Process Score Point 2



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

20 kids ride the bus to school each day. I added one x to 2, 6, and 9, and then I added the all up.

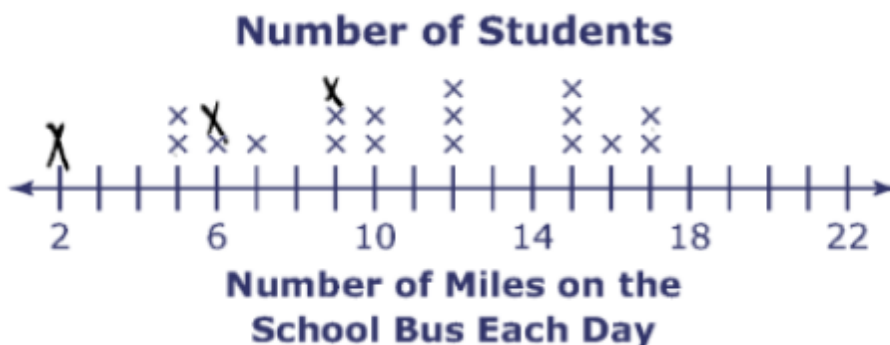
Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer 15 miles

Scoring Notes: The response demonstrates a thorough understanding of representing and interpreting data by correctly plotting the Xs on the line plot in Part A and correctly identifying the number of students that ride the bus to school in Part B. The response demonstrates a thorough understanding of reasoning quantitatively by providing a valid explanation for how to find the total number of students in Part B and by finding the correct distance in Part C. This response receives two points for content and two points for process.

Question 2, Sample B – Data Analysis Score Point 2; Process Score Point 1



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

20 I counted the X's.

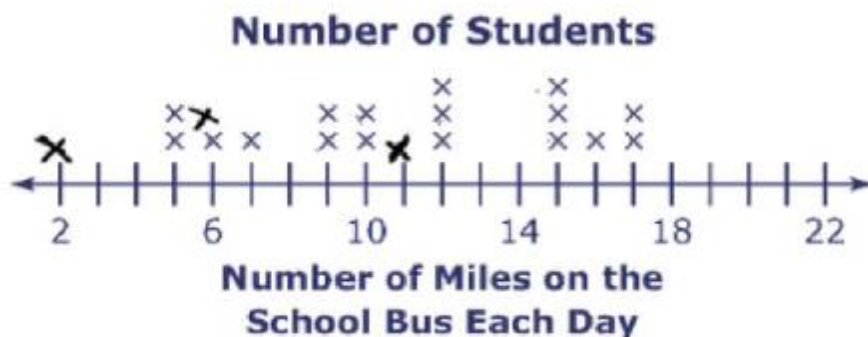
Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer _____ miles

Scoring Notes: The response demonstrates a thorough understanding of representing and interpreting data by correctly plotting the Xs on the line plot in Part A and correctly identifying the number of students that ride the bus to school in Part B. The response demonstrates a partial understanding of reasoning quantitatively by providing a valid explanation for how to find the total number of students in Part B, but the response fails to identify the number of miles in Part C. This response receives two points for content and one point for process.

Question 2, Sample C – Data Analysis Score Point 1; Process Score Point 2



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

20, I found this by counting the X's
and including Joseph, Zoey, and Sara.

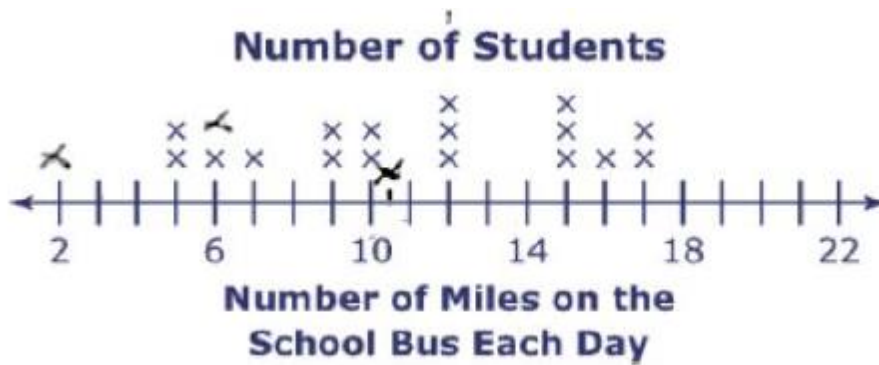
Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer 15 miles

Scoring Notes: The response demonstrates a partial understanding of representing and interpreting data by correctly identifying the number of students that ride the bus to school in Part B. However, the X for 9 miles is plotted incorrectly in Part A. The response demonstrates a thorough understanding of reasoning quantitatively by providing a valid explanation for how to find the total number of students in Part B and by finding the correct distance in Part C. This response receives one point for content and two points for process.

Question 2, Sample D – Data Analysis Score Point 1; Process Score Point 1



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

20 is the total number of students that
ride the bus to school each day. I know
because each X = 1 student.

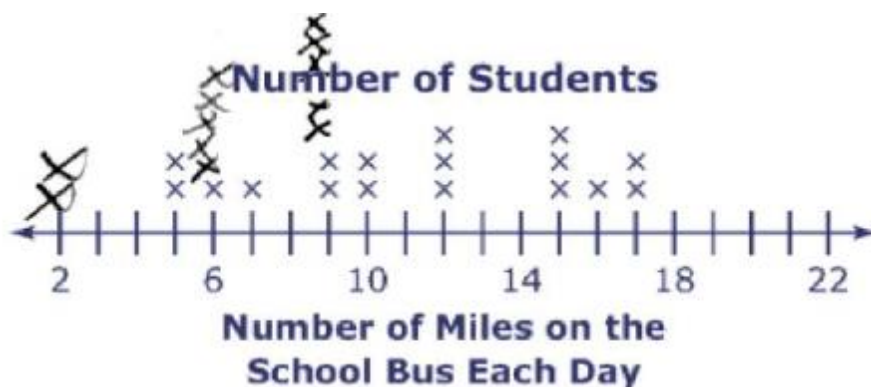
Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer 4.4 miles

Scoring Notes: The response demonstrates a partial understanding of representing and interpreting data by correctly identifying the number of students that ride the bus to school in Part B. However, the X for 9 miles is plotted incorrectly in Part A. The response demonstrates a partial understanding of reasoning quantitatively by providing a valid explanation for how to find the total number of students in Part B but incorrectly finding the distance in Part C. This response receives one point for content and one point for process.

Question 2, Sample E – Data Analysis Score Point 0; Process Score Point 1



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

I got 19 people because
it is put the kid next to
the number to get your
answer

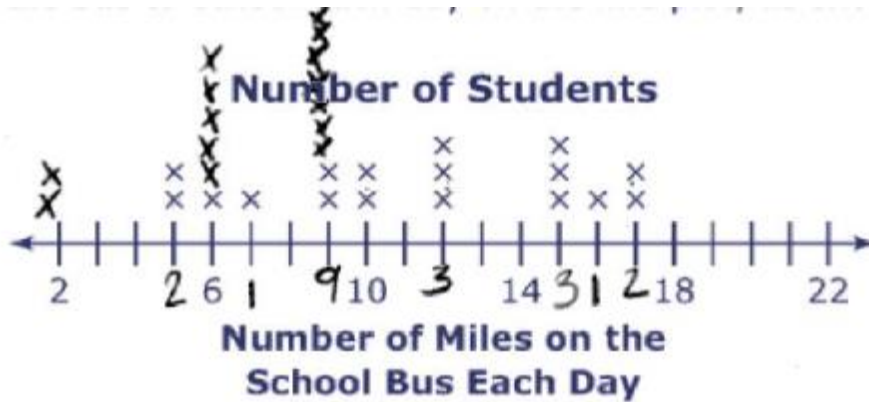
Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer 15 miles

Scoring Notes: The response demonstrates a limited understanding of representing and interpreting data by incorrectly plotting the Xs in the line plot in Part A and by incorrectly identifying the number of students that ride the bus to school in Part B based on the line plot. The response demonstrates a partial understanding of reasoning quantitatively by finding the correct distance in Part C. However, the response provides an invalid explanation for how to find the total number of students in Part B. This response receives zero points for content and one point for process.

Question 2, Sample F – Data Analysis Score Point 0; Process Score Point 0



Part A

Plot X's on the line plot above to include the data for Joseph, Zoey, and Sara.

Part B

Based on the line plot, what is the total number of students that ride the bus to school each day? Explain how you determined your answer.

13 because I counted from
2 from 22 to get my answer.
13 kids.

Part C

What is the difference, in miles, between the farthest distance and the shortest distance a student rides the bus to school?

Answer 21 miles

Scoring Notes: The response demonstrates a limited understanding of representing and interpreting data by incorrectly plotting the X's in the line plot in Part A and by incorrectly identifying the number of students that ride the bus to school in Part B based on the line plot. The response demonstrates a limited understanding of reasoning quantitatively by providing an invalid explanation for how to find the total number of students in Part B and by finding the incorrect distance in Part C. This response receives zero points for content and zero points for process.

Item #3
Constructed-Response

Constructed-Response
Standard 4: Geometry
Standard 7: Mathematical Process

Question 3

- 3.** Jamie sorts 6 shapes into three groups based on their angle measures. She places some shapes in more than one group, as shown.

| Group One | Group Two | Group Three |
|---|---|--|
|  |  |  |

Part A

Complete each sentence.


All of the shapes in Group One have at least one _____ angle.

All of the shapes in Group Two have at least one _____ angle.

All of the shapes in Group Three have at least one _____ angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|--|
|  |  |

Explain the rule Ivan used to sort the shapes into Group One.

Exemplary Response:

- All of the shapes in Group One have at least one right angle.
- All of the shapes in Group Two have at least one acute angle.
- All of the shapes in Group Three have at least one obtuse angle.

AND

- Ivan put all the shapes with at least one pair of parallel sides in Group One.
- Other valid explanation

Question 3, Sample A – Geometry Score Point 2; Process Score Point 2

Part A

Complete each sentence.


All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one acute angle.

All of the shapes in Group Three have at least one obtuse angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|  |  |

Explain the rule Ivan used to sort the shapes into Group One.

The rule Ivan used to sort the shapes in group one
is each shape has at least 1 pair of parallel
sides.

Scoring Notes: The response demonstrates a thorough understanding of identifying and classifying triangles by correctly completing each sentence in Part A. The response demonstrates a thorough understanding of looking for structure and constructing viable arguments by providing a valid explanation for the rule Ivan used to sort the shapes into Group One. This response receives two points for content and two points for process.

Question 3, Sample B – Geometry Score Point 2; Process Score Point 0

Part A

Complete each sentence.

All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one acute angle.

All of the shapes in Group Three have at least one obtuse angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|     |   |

Explain the rule Ivan used to sort the shapes into Group One.

Ivan sorted them by right angles
and by obtuse angles.

Scoring Notes: The response demonstrates a thorough understanding of identifying and classifying triangles by correctly completing each sentence in Part A. The response demonstrates a limited understanding of looking for structure and constructing viable arguments by providing an invalid explanation for the rule Ivan used to sort the shapes into Group One. This response receives two points for content and zero points for process.

Question 3, Sample C – Geometry Score Point 1; Process Score Point 2

Part A

Complete each sentence.

All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one acute angle.

All of the shapes in Group Three have at least one acute angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|     |   |

Explain the rule Ivan used to sort the shapes into Group One.

Group one has 1 parallel lines.

Scoring Notes: The response demonstrates a partial understanding of identifying and classifying triangles by correctly completing two of the three sentences in Part A. The response demonstrates a thorough understanding of looking for structure and constructing viable arguments by providing a valid explanation for the rule Ivan used to sort the shapes into Group One. This response receives one point for content and two points for process.

Question 3, Sample D – Geometry Score Point 1; Process Score Point 0

Part A

Complete each sentence.







All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one right angle.

All of the shapes in Group Three have at least one obtuse angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|     |   |

Explain the rule Ivan used to sort the shapes into Group One.

In group one the way he sorted it out is he
sorted it out by the shapes that have Right angles.

Scoring Notes: The response demonstrates a partial understanding of identifying and classifying triangles by correctly completing two of the three sentences in Part A. The response demonstrates a limited understanding of looking for structure and constructing viable arguments by providing an invalid explanation for the rule Ivan used to sort the shapes into Group One. This response receives one point for content and zero points for process.

Question 3, Sample E – Geometry Score Point 0; Process Score Point 2

Part A

Complete each sentence.

All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one obtuse angle.

All of the shapes in Group Three have at least one acute angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|  |  |

Explain the rule Ivan used to sort the shapes into Group One.

The rule Ivan used was, each shape had to
have a set of parallel lines.

Scoring Notes: The response demonstrates a limited understanding of identifying and classifying triangles by correctly completing only one sentence in Part A. The response demonstrates a thorough understanding of looking for structure and constructing viable arguments by providing a valid explanation for the rule Ivan used to sort the shapes into Group One. This response receives zero points for content and two points for process.

Question 3, Sample F – Geometry Score Point 0; Process Score Point 0

Part A

Complete each sentence.

All of the shapes in Group One have at least one right angle.

All of the shapes in Group Two have at least one Obtuse angle.

All of the shapes in Group Three have at least one acute angle.

Part B

Ivan sorts the same 6 shapes into two groups, as shown, based on a characteristic of the sides of the shapes.

| Group One | Group Two |
|---|---|
|     |   |

Explain the rule Ivan used to sort the shapes into Group One.

In Group One he used right
angles. In Group two used acute
angles.

Scoring Notes: The response demonstrates a limited understanding of identifying and classifying triangles by correctly completing only one sentence in Part A. The response demonstrates a limited understanding of looking for structure and constructing viable arguments by providing an invalid explanation for the rule Ivan used to sort the shapes into Group One. This response receives zero points for content and zero points for process.

Item #4
Extended-Response

Extended-Response
Standard 5: Measurement
Standard 7: Mathematical Process

Question 4

4. Janet is building a play house using cardboard boxes. She has three boxes as described in the table.

| Box | Length (feet) | Width (feet) | Height (feet) |
|-----|------------------|-----------------|------------------|
| A | 5 | 4 | 6 |
| B | 3 | 4 | 6 |
| C | 4 | 4 | 4 |

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer _____ cubic feet

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

Exemplary Response:

- 192 cubic feet

AND

- No, the total volume of the three boxes is 256 feet.

AND

- 1 A Box, 2 B Boxes, and 1 C Box
- Sample Process:

Volume of Box A: $4 \times 5 \times 6 = 120$ cubic feet

Volume of Box B: $3 \times 4 \times 6 = 72$ cubic feet

$$120 + 72 = 192 \text{ cubic feet}$$

$$4 \times 4 \times 4 = 64 \text{ cubic feet}$$

$$192 + 64 = 256 \text{ cubic feet}$$

$$328 - 256 = 72$$

OR

- Other valid process

Question 4, Sample A – Measurement Score Point 3; Process Score Point 3

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 192 cubic feet

$$\begin{array}{r} (5 \times 4) \times 6 \\ (20 \times 6) \\ 120 \end{array} \quad \begin{array}{r} (3 \times 4) \times 6 \\ (12 \times 6) \\ 72 \end{array} \quad \begin{array}{r} 120 \\ 72 \\ \hline 192 \end{array}$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} (4 \times 4) \times 4 \\ (16 \times 4) \\ 64 \end{array} \quad \begin{array}{r} 2 \\ 16 \\ \times 4 \\ \hline 64 \end{array}$$

$$\begin{array}{r} + 192 \\ 64 \\ \hline 256 \end{array} \quad \begin{array}{r} 278 \\ - 256 \\ \hline 22 \end{array}$$

Janet is not correct! I know this
because box A + box B + box C = 256 and
Janet's guess was 278, 22 more than
256.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

Box A - 1 120
Box B - 1 1
Box C - 1

$$\begin{array}{r} 256 \\ + 72 \\ \hline 328 \end{array}$$

1-A, B, and C

The four boxes Janet would need are 1 Box A, 2 Box Bs, and 1 box C.

Scoring Notes: The response demonstrates a thorough understanding of finding volume in real-world problems by finding the correct volume in Part A, the correct volumes for each box in Parts A and B, and the total volume of all three boxes in Part B. The response demonstrates a thorough understanding of reasoning quantitatively and constructing viable arguments by providing a valid explanation of why Janet is incorrect in Part B and by providing the correct number of boxes in Part C with a valid setup. This response receives three points for content and three points for process.

Question 4, Sample B – Measurement Score Point 3; Process Score Point 2

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 192 cubic feet

$$\begin{array}{r} 5 \\ \times 4 \\ \hline 20 \\ \times 6 \\ \hline 120 \end{array} \quad \begin{array}{r} 3 \\ \times 4 \\ \hline 12 \\ \times 6 \\ \hline 72 \end{array} \quad \begin{array}{r} 120 \\ + 72 \\ \hline 192 \end{array}$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \\ + 4 \\ \hline 64 \end{array} \quad \begin{array}{r} 192 \\ + 64 \\ \hline 256 \end{array}$$

We know from the first 2 boxes was 192
cubic feet. So then you would do $4 \times 4 \times 4 = 64 +$
 $192 = 256$ so she was wrong.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

$$\begin{array}{r} 2 12 \\ - 328 \\ \hline 256 \\ - 72 \\ \hline \end{array}$$

She would use boxes A, B, C & C again.

Scoring Notes: The response demonstrates a thorough understanding of finding volume in real-world problems by finding the correct volume in Part A, the correct volumes for each box in Parts A and B, and the total volume of all three boxes in Part B. The response demonstrates a partial understanding of reasoning quantitatively and constructing viable arguments by providing a valid explanation of why Janet is incorrect in Part B and by providing a valid setup for Part C. However, the response does not provide the correct number of boxes that is supported by the setup in Part C. This response receives three points for content and two points for process.

Question 4, Sample C – Measurement Score Point 2; Process Score Point 2

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 256 cubic feet

$$\begin{array}{l} 5 \times 4 \times 6 = 120 \\ \quad \quad \quad \vee \\ 20 \times 6 = 120 \\ 26 \quad 4 \times 4 \times 4 \\ \quad \quad \quad \vee \\ 16 \times 4 = 64 \\ 26 \end{array} \quad \begin{array}{l} 3 \times 4 \times 6 = 72 \\ \quad \quad \quad \vee \\ 12 \times 6 = 72 \\ 72 \end{array} \quad \begin{array}{r} 120 \\ 72 \\ 64 \\ \hline 256 \end{array}$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{l} \text{Box A: } 5 \times 4 \times 6 = 120 \\ \quad \quad \quad \vee \\ 20 \times 6 = 120 \end{array} \quad \begin{array}{l} \text{Box B: } 3 \times 4 \times 6 = 72 \\ \quad \quad \quad \vee \\ 12 \times 6 = 72 \end{array} \quad \begin{array}{l} \text{Box C: } 4 \times 4 \times 4 = 64 \\ \quad \quad \quad \vee \\ 16 \times 4 = 64 \end{array} \quad \begin{array}{r} 120 \\ 72 \\ 64 \\ \hline 256 \end{array}$$

Janet is not correct because the volume of box A is 120. The
volume of box B is 72. The volume of box C is 64. $120 + 72 + 64 = 256$.
256 is the total volume, not 278.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

$$\begin{array}{r}
 120 \\
 + 72 \\
 \hline
 192 \\
 + 128 \\
 \hline
 320
 \end{array}$$

$$\begin{array}{r}
 64 \\
 \times 2 \\
 \hline
 128
 \end{array}$$

$$\begin{array}{r}
 120 \\
 + 64 \\
 \hline
 184 \\
 + 144 \\
 \hline
 328
 \end{array}$$

$$\begin{array}{r}
 72 \\
 \times 2 \\
 \hline
 144
 \end{array}$$

Janet uses 1 A box, 1 B box, and 2 C boxes. I know this because $120 + 64 = 184$, $184 + 144 = 328$.

Scoring Notes: The response demonstrates a partial understanding of finding volume in real-world problems by finding the correct volume of each individual box in Parts A and B and the correct total volume of all three boxes in Part B. However, the response incorrectly determined the volume of Boxes A and B combined in Part A. The response demonstrates a partial understanding of reasoning quantitatively and constructing viable arguments by providing a valid explanation of why Janet is incorrect in Part B and by providing a valid setup for Part C. However, the response does not provide the correct number of boxes that is supported by the setup in Part C. This response receives two points for content and two points for process.

Question 4, Sample D – Measurement Score Point 2; Process Score Point 1

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 120 cubic feet

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} 2 \\ 16 \\ \times 4 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 12 \\ \times 6 \\ \hline 72 \end{array}$$

$$\begin{array}{r} 5 \times 4 \times 6 = 120 \\ 3 \times 4 \times 6 = 72 \\ 4 \times 4 \times 4 = 64 \\ \hline 256 \end{array}$$

no she is not correct because
I did all of the multiplication
and addition and I 256.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

$$5 \times 4 \times 6 = 120$$
$$\begin{array}{r} 120 \\ \times 4 \\ \hline 480 \end{array}$$

she uses boxes A+B because
 $5 \times 4 \times 6 = 120$ and $120 \times 4 = 480$ and that's close to 328

Scoring Notes: The response demonstrates a partial understanding of finding volume in real-world problems by finding the correct volumes for each box in Part B and the total volume of all three boxes in Part B. However, the response incorrectly determines the volume of Boxes A and B in Part A. The response demonstrates a limited understanding of reasoning quantitatively and constructing viable arguments with a valid explanation of why Janet is incorrect in Part B but an invalid setup and incorrect number of boxes in Part C. This response receives two points for content and one point for process.

Question 4, Sample E – Measurement Score Point 1; Process Score Point 1

| Box | Length (feet) | Width (feet) | Height (feet) |
|-----|------------------|-----------------|------------------|
| A | 5 | 4 | 6 |
| B | 3 | 4 | 6 |
| C | 4 | 4 | 4 |

$$\begin{array}{r} 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ \hline 720 \end{array}$$

$$\begin{array}{r} 20 \\ 20 \\ 20 \\ 20 \\ 20 \\ 20 \\ \hline 120 \end{array}$$

Part A

$$\begin{array}{r} 120 \\ + 72 \\ \hline 182 \end{array}$$

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 182 cubic feet

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} 120 \\ 72 \\ + 32 \\ \hline 224 \end{array}$$

No she is not correct
it would be 224 because
 $120 + 72 + 32 = 224$

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

$$\begin{array}{r} 164 \\ 2 \overline{) 328} \\ \underline{2} \\ 12 \\ \underline{12} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

$$\begin{array}{r} 82 \\ 4 \overline{) 328} \\ \underline{32} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Scoring Notes: The response demonstrates a limited understanding of finding volume in real-world problems by correctly determining the volume of two of the three boxes in Parts A and B. The response also incorrectly determines the total volume of Boxes A and B in Part A. The response demonstrates a limited understanding of reasoning quantitatively and constructing viable arguments with a valid explanation of why Janet is incorrect in Part B. (The conclusion is still valid even with an incorrect total volume for all three boxes.) The response provides an invalid setup for Part C and does not describe which four boxes Janet uses. This response receives one point for content and one point for process.

Question 4, Sample F – Measurement Score Point 1; Process Score Point 0

| Box | Length (feet) | Width (feet) | Height (feet) |
|-----|---------------|--------------|---------------|
| A | 5 | 4 | 6 |
| B | 3 | 4 | 6 |
| C | 4 | 4 | 4 |

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 192 cubic feet

$$\begin{array}{r} 12 \\ \times 6 \\ \hline 72 \end{array}$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} 16 \\ \times 4 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 192 \\ \times 46 \\ \hline 238 \end{array}$$

No, Janet is incorrect, because you would have to do 4×4 which equals 16.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

Scoring Notes: The response demonstrates a limited understanding of finding volume in real-world problems by correctly determining the total volume of Boxes A and B in Part A only. The response demonstrates limited or no understanding of reasoning quantitatively and constructing viable arguments with an invalid explanation of why Janet is incorrect in Part B and failure to complete any portion of Part C. This response receives one point for content and zero points for process.

Question 4, Sample G – Measurement Score Point 0; Process Score Point 1

| Box | Length (feet) | Width (feet) | Height (feet) |
|-----|------------------|-----------------|------------------|
| A | 5 | 4 | 6 |
| B | 3 | 4 | 6 |
| C | 4 | 4 | 4 |

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 8,640 cubic feet

$$\begin{array}{r} 240 \\ \times 6 \\ \hline 1440 \end{array} \quad \begin{array}{r} 240 \\ \times 6 \\ \hline 1440 \end{array}$$

$$5 \times 3 = 15 \times 4 = 60 \times 4 = 240 \times 6 = 1440 \times 6 = 8,640$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

$$\begin{array}{r} 2 \\ 960 \\ \times 4 \\ \hline 3840 \\ \times 6 \\ \hline 23040 \end{array}$$

Show All Work $\rightarrow 5 \times 3 = 15 \times 4 = 60 \times 4 = 240 \times 4 = 960 \times 4 = 3840 \times 6 = 23,040$

Janet is not correct because she got some thing way smaller because I got 138,240 she got only 248 cubic feet.
answer - 138,240 cubic ft.

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work $2 \times 2 \times 4 \times 6 \times 6 = 1$

$$\begin{array}{r} 3 \\ \times 16 \\ \hline 48 \\ \times 186 \\ \hline 4 \end{array}$$

Janet used boxes A, B, C, and another B
as also.

Scoring Notes: The response demonstrates limited or no understanding of finding volume in real-world problems by determining an incorrect total volume of Boxes A and B in Part A, an incorrect total volume of all three boxes in Part B, and an incorrect volume for each box individually. The response demonstrates a limited understanding of reasoning quantitatively and constructing viable arguments with an invalid explanation of why Janet is incorrect in Part B. The response does correctly determine the number of boxes needed in Part C but does not have a valid process to support that answer. This response receives zero points for content and one point for process.

Question 4, Sample H – Measurement Score Point 0; Process Score Point 0

Janet is building a play house using cardboard boxes. She has three boxes as described in the table.

| Box | Length (feet) | Width (feet) | Height (feet) |
|-----|---------------|--------------|---------------|
| A | 5 | 4 | 6 |
| B | 3 | 4 | 6 |
| C | 4 | 4 | 4 |

$$\begin{array}{r} 5 \\ +4 \\ \hline 9 \\ +6 \\ \hline 15 \end{array} \quad \begin{array}{r} 3 \\ +4 \\ \hline 7 \\ +6 \\ \hline 13 \end{array}$$

Part A

What is the total volume, in cubic feet, of the play house if Janet uses Box A and Box B?

Answer 28 cubic feet

$$\begin{array}{r} 15 \\ +13 \\ \hline 28 \end{array}$$

Part B

Janet thinks that if she uses all three boxes, the total volume of the play house will be 278 cubic feet.

Is Janet correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

$$\begin{array}{r} 278 \\ +15 \\ \hline 293 \end{array}$$

she is not right Because it
don't add up to 278 it = 293

Part C

Janet's dad gives her more boxes. The table shows the number of each box Janet has now.

| Box | Number |
|-----|--------|
| A | 2 |
| B | 2 |
| C | 4 |

Janet uses a total of 4 boxes. The total volume of the 4 boxes is 328 cubic feet.

What are the 4 boxes Janet uses?

Show All Work

$$\begin{array}{r} 4 \\ +4 \\ \hline 8 \end{array}$$

All Because if you do them
all over again you will get the
total

Scoring Notes: The response demonstrates limited or no understanding of finding volume in real-world problems by determining an incorrect total volume of Boxes A and B in Part A, an incorrect total volume of all three boxes in Part B, and an incorrect volume for each box individually. The response demonstrates limited or no understanding of reasoning quantitatively and constructing viable arguments with an invalid explanation of why Janet is incorrect in Part B and by providing an invalid setup and number of boxes in Part C. This response receives zero points for content and zero points for process.